

# REPORT DOCUMENTATION PAGE

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MEMORANDUM FOR PRS (In-House Publication)

FROM: PROI (STINFO)

18 October 2002

SUBJECT: Authorization for Release of Technical Information, Control Number: **AFRL-PR-ED-PR-2002-240**  
Jeff Thornburg (PRSE), "Air Force Research Laboratory's Rocket Engine Program Enters Fast-Paced  
Test Phase"

**General Public**  
**(Walk-through)**

**(Statement A)**

## Air Force Research Laboratory's rocket engine program enters fast-paced test phase

EDWARDS AFB, Calif. — Testing is underway of critical components for integration into the world's first full flow cycle hydrogen/oxygen boost engine. Recent tests of the Integrated Powerhead Demonstration project here established a technical first for the United States and mark the first advancements in boost engine technology since the space shuttle main engine was initially developed in the 1970's.

The Department of Defense's Integrated Powerhead Demonstration project — developed by the Air Force Research Laboratory Propulsion Directorate — is ongoing at the Aerojet E-Complex test facilities in Sacramento.

*Pay off*  
"The program supports the Integrated High Performance Rocket Propulsion Technology program," said AFRL's Capt. Jeff Thornburg, project manager. "The goal of this Defense Department, NASA and industry collaboration is to develop revolutionary and innovative technologies by the year 2010 that double rocket propulsion capabilities over early 1990s state-of-the-art technology."

*E-Complex @ Stennis*

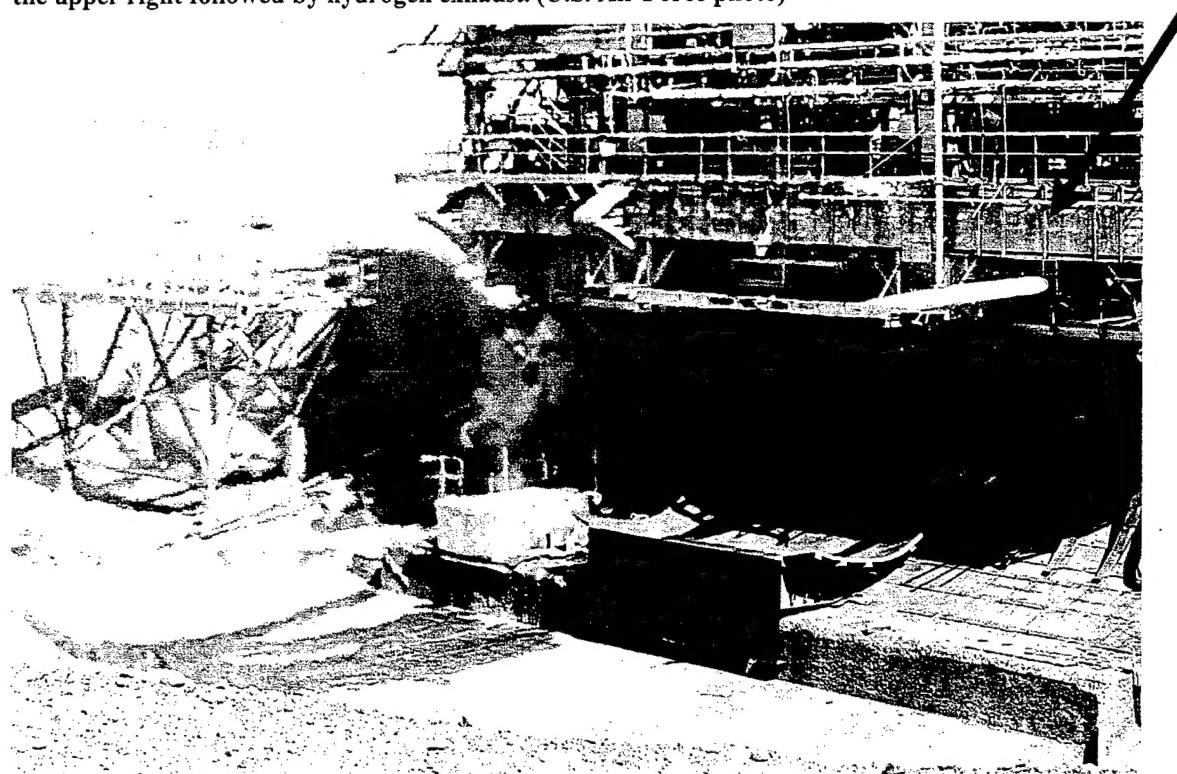
"The IPD fuel "preburner" was successfully tested recently to 50 percent power, satisfying all pre-test predictions and meeting all test objectives," Thornburg said. The preburner will eventually deliver hot hydrogen drive gas to power an advanced hydrogen turbo pump in the engine system.

Thornburg said this successful test kicks off a new stage in the IPD program where combustion and turbomachinery components will be tested at both Aerojet, and NASA's Stennis Space Center in Mississippi through early 2003.

The program brings together combustion device components from Aerojet, and turbomachinery and system integration expertise from Boeing-Rocketdyne, Canoga Park, Calif., that will extend the life cycle of boost engines, and reduce the amount of maintenance between missions.

*↑*  
*reusable*

IPD Fuel Preburner being tested on the E Complex at Aerojet in Sacramento, CA. The plume can be seen in the upper right followed by hydrogen exhaust. (U.S. Air Force photo)



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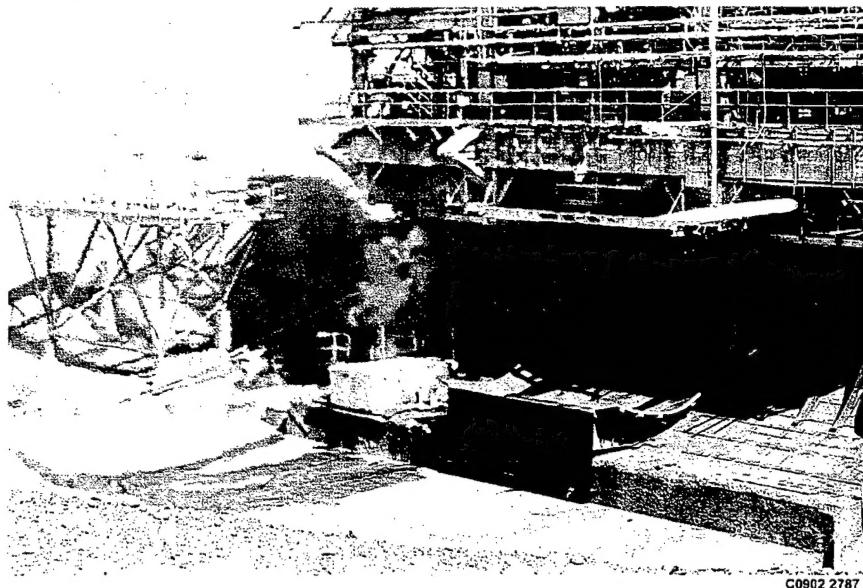


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## **Success Story**

### Integrated Powerhead Demonstration project enters fast-paced test phase



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Testing is underway of critical components for integration into the world's first full flow cycle hydrogen/oxygen boost engine. Recent tests of the Integrated Powerhead Demonstration project at Edwards AFB, Calif., established a technical first for the United States and mark the first advancements in boost engine technology since the space shuttle main engine was initially developed in the 1970's.

#### **Accomplishment**

Testing of the Department of Defense's Integrated Powerhead Demonstration (IPD) project developed by the Air Force Research Laboratory (AFRL) Propulsion Directorate at Edwards AFB, CA is underway at the Aerojet E-Complex test facilities in Sacramento, CA. On September 20, the IPD fuel preburner was successfully tested to 50% power satisfying all pre-test predictions and meeting all test objectives. The fuel preburner will eventually deliver hot hydrogen drive gas to power an advanced hydrogen turbopump in the engine system.

This successful test kicks off a new stage in the IPD program where combustion and turbomachinery components will be tested at both Aerojet, and NASA's Stennis Space Center in Mississippi through early 2003. Following this test phase, all components will be integrated into the world's first full flow cycle hydrogen/oxygen boost engine.

## **Background**

The IPD program supports the Department of Defense Integrated High Performance Rocket Propulsion Technology (IHPPT) program. The goal of this IHPPT program is to satisfy phase one milestones for doubling the capability of boost engines for access to space. IPD has also proven to be a very successful partnership between AFRL and NASA's Marshall Space Flight Center, Huntsville, AL which provides technical expertise and program support.

IPD's full flow staged combustion engine is a technical first for the United States. The program brings together combustion device components from Aerojet, and turbomachinery and system integration expertise from Boeing-Rocketdyne, Canoga Park, CA that will extend the life cycle of boost engines, and reduce the amount of maintenance between missions. IPD is also the first cryogenic boost engine technology program since the Space Shuttle Main Engine was developed in the 1970's. The IHPPT program is a DoD/NASA/Industry coordinated effort to develop revolutionary and innovative technologies by the year 2010 that will double rocket propulsion capabilities over 1993 state-of-the-art technology.



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## **Additional information**

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